

Chapter 7

Glossary of Terms

Absorbed Dose: The energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest in that material. Expressed in units of radiation absorbed dose (rad) or grays, where 1 rad equals 0.01 gray. Also, see "Radiation Absorbed Dose."

Accident Sequence: An initiating event followed by system failures or operator errors, which can result in significant core damage, confinement system failure, and/or radionuclide releases.

Actinides: Radioactive elements with atomic number larger than 88 (that is, 89 or higher)

Action Description Memorandum: A document used in the DOE's NEPA process to facilitate a determination of the appropriate level of NEPA documentation for a proposed action.

Acute: Extremely severe or intense for a limited amount of time.

Acute Exposure: The exposure incurred during and shortly after a radiological release. Generally, the period of acute exposure ends when long-term interdiction is established, as necessary. For convenience, the period of acute exposure is normally assumed to end 1 week after the inception of a radiological accident.

Acute Standard: A numerical limit on the amount of a particular chemical contaminant that an organism may be exposed to over a short period of time.

Air Pollutant: Any substance in air which could, if in high enough concentration, harm man, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of matter capable of being airborne.

Air Quality Control Region (AQCR): An interstate area designated by the EPA for the attainment and maintenance of NAAQS.

Air Quality Standards: The level of pollutants in the air prescribed by regulations that may not be exceeded during a specified time in a defined area.

Alloy: A homogeneous mixture of two or more metals.

Alluvial Deposits: Deposits of earth, sand, gravel, and other materials carried by moving surface water and deposited at points of weak water flow.

Alluvium: A general term for all sedimentary accumulations that are deposited by surface water flow. Alluvium includes sediment laid down in riverbeds, flood plains, and alluvial fans.

Alpha Activity: The emission of alpha particles by fissionable materials (uranium or Pu).

Alpha Particle: A positively charged particle, consisting of two protons and two neutrons, that is emitted during radioactive decay from the nucleus of certain nuclides. It is the least penetrating of the three common types of radiation (alpha, beta, and gamma).

Alpha Wastes: Wastes containing radioactive isotopes which decay by producing alpha particles.

Alternative Option: A group of alternative pathways through a different specific set of facilities than that of the baseline or another option.

Ambient Air: The surrounding atmosphere as it exists around people, plants, and structures.

American Indian Religious Freedom Act of 1978: This Act establishes national policy to protect and preserve for Native Americans their inherent right of freedom to believe, express, and exercise their traditional religions, including the rights of access to religious sites, use and possession of sacred objects, and the freedom to worship through traditional ceremonies and rites.

Anadromous: Fish that migrate from salt to fresh water to spawn.

Anadromous Fish Conservation Act: This act seeks to enhance the conservation and development of the anadromous fishery resources of the United States that are subject to depletion from water resources development.

Anhydrous: Without water.

Anisotropic: Conditions where a physical phenomenon is oriented preferentially in a particular direction or on a particular axis. When the groundwater in a region moves north/south faster than it moves east/west, the groundwater movement is anisotropic.

Aquatic Biota: The sum total of living organisms within any designated aquatic area.

Aqueous Process: An operation involving chemicals dissolved in water.

Aquifer: A saturated geologic unit through which significant quantities of water can migrate under natural hydraulic gradients.

Aquitard: A less-permeable geologic unit in a stratigraphic sequence. The unit is not permeable enough to transmit significant quantities of water. Aquitards separate aquifers.

Archaeological and Historic Preservation Act of 1974: This Act is designed to preserve historic and archaeological data that could be destroyed or compromised as the result of Federal construction or other Federally licensed or assisted activities.

Archaeological Resources Protection Act of 1979: This Act serves to protect cultural resources on Federally owned lands. It requires a permit for archaeological excavations or removal of any archaeological resources located on public lands or Native American lands. It prohibits interstate or foreign trafficking of cultural resources taken in violation of state or local laws, and requires Federal agencies to develop plans for surveying lands under their control.

Archaeological Sites: Any location where humans have altered the terrain or discarded artifacts during either prehistoric or historic times.

Artifact: An object produced or shaped by human workmanship of archaeological or historical interest.

As Low as Reasonably Achievable (ALARA): A concept applied to the quantity of radioactivity released in routine operation of a nuclear system or facility, including "anticipated operational occurrences." It takes into account the state of technology, economics of improvements in relation to benefits to public health and safety, and other societal and economic considerations in relation to the use of nuclear energy in the public interest.

Atmospheric Dispersion: The process of air pollutants being dispersed in the atmosphere. This process occurs through wind movement that carries the pollutants away from their source. It is also due to turbulent air motion that results from solar heating of the Earth's surface and air movement over rough terrain and surfaces.

Atomic Energy Act (AEA) of 1954: This Act was originally enacted in 1946 and amended in 1954. For the purpose of this PEIS "...a program for Government control of the possession, use, and production of atomic energy and special nuclear material whether owned by the Government or others, so directed as to make the maximum contribution to the common defense and security and the national welfare, and to provide continued assurance of the Government's ability to enter into and enforce agreements with nations or groups of nations for the control of special nuclear materials and atomic weapons..." (Section 3(c)).

Atomic Energy Commission: A five-member commission, established by the AEA of 1946, to supervise nuclear weapons design, development, manufacturing, maintenance, modification, and dismantlement. In 1974, the AEC was abolished and all functions were transferred to the NRC and the Administrator of the Energy Research and Development Administration. The Energy Research and Development Administration was later terminated and its functions vested by law in the Administrator were transferred to the Secretary of Energy.

Attainment Area: An area considered to have air quality as good as or better than the national ambient air quality standards as defined in the CAA. An area may be an attainment area for one pollutant and a non-attainment area for others.

Attribute: A measurable relevant characteristic of an option, such as public acceptability or technical risk.

Background Radiation: Ionizing radiation present in the environment from cosmic rays and natural sources in the Earth; background radiation varies considerably with location. Also, see "Natural Radiation."

Badged Worker: A worker equipped with an individual dosimeter who has the potential to be exposed to radiation.

Bald and Golden Eagle Protection Act: This act states that it is unlawful to take, pursue, molest, or disturb the American bald and golden eagle, their nests, or their eggs, anywhere in the United States.

Basalt: The most common volcanic rock. Basalt is dark-gray to black in color, high in iron and magnesium, and low in silica. It is typically found in lava flows.

Base Requirement: The nuclear material quantity needed to support the nuclear weapons stockpile (new weapons builds, research and development, and tests) and other needs (nonweapons research and development, isotopic power devices, and commercial sales).

Baseline: A quantitative expression of conditions, costs, schedule, or technical progress to serve as a base or standard for measurement during the performance of an effort; the established plan against which the status of resources and the progress of a project can be measured. For this PEIS, the environmental baseline is the site environmental conditions as they are projected to occur in 2005.

Basin: For geology it is a circular or elliptical downwarp with younger beds in the center after erosion exposes the structure. For topography it is a depression into which the surrounding area drains.

BEIR V: Biological Effects of Ionizing Radiation; referring to the fifth in a series of committee reports from the National Research Council.

Benthic: Plants and animals dwelling at the bottom of oceans, lakes, rivers, and other surface waters.

Best Available Control Technology: A term used in the CAA that means the most stringent level of air pollutant control considering economics for a specific type of source based on demonstrated technology.

Beta Activity: The emission of beta particles by radioisotopes.

Beta Particle: An elementary particle emitted from a nucleus during radioactive decay; it is negatively or positively charged, identical in mass to an electron, and in most cases easily stopped, as by a thin sheet of metal.

Beyond Design Basis Accident: An accident, generally with more severe impacts to onsite personnel and the public than a DBA, initiated by operational or external causes with an estimated probability of occurrence less than 10^{-6} per year and used for estimating the impacts of a facility and/or process.

Biofouling: Aquatic organisms such as bacteria, fungi, algae, and mollusks, that colonize in waterflow structures (for example, cooling water systems of power plants/reactors), often causing restricted water flow.

Biological Dose: The radiation dose absorbed in biological material measured in rem or millirem (one-thousandth of a rem).

Biota (Biotic): The plant and animal life of a region.

Biotic Resources: Biotic resources include terrestrial resources, wetlands, and aquatic resources, and threatened and endangered species.

Boiling Water Reactor (BWR): A type of nuclear reactor that uses fission heat to generate steam in the reactor to drive turbines and generate electricity.

Borehole: A deep hole drilled below the water table and at least 2 km (1.2 mi) deep into ancient, geologically stable rock formations.

Bryozoa: A phylum consisting of various small aquatic animals that reproduce by budding and form colonies attached to stones or seaweed.

Burn: To consume in a reactor through fission.

Burnable Poison Rod: A nuclear reactor rod used to absorb excess neutrons in the core during the early core life. As the core life proceeds, the absorbing material is depleted ("burned"), reducing the absorptive power concurrent with the reduction in excess neutron production.

Calcareous: Containing calcium carbonate (for example, calcite or limestone).

Calcination: The process of converting high-level waste to unconsolidated granules or powder. Calcined solid wastes are primarily salts and oxides of metals (heavy metals) and components of high level waste (also called calcining).

Calcine: Drying of liquids or other material at high temperature (approximately 800° C) to drive off water and other volatile substances.

Caldera: A large crater formed by the collapse of the central part of a volcano.

Cancer: The name given to a group of diseases characterized by uncontrolled cellular growth with cells having invasive characteristics such that the disease can transfer from one organ to another.

Canadian Deuterium Uranium (CANDU) Reactor: A nuclear reactor in which circulating heavy water is used to cool the reactor core and to moderate (reduce the energy of) the neutrons created in the core by the fission reactions.

Canyon: A remotely operated, heavily shielded Pu or uranium processing facility.

Capable Fault: As defined in 10 CFR 100, Appendix A, III (g), a fault that has exhibited one or more of the following characteristics: (1) Movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years; (2) Macro-seismicity instrumentally determined with records of sufficient precision to demonstrate a direct relationship with the fault; (3) A structural relationship to a capable fault according to characteristics (1) or (2) such that movement on one could be reasonably expected to be accompanied by movement on the other. Notwithstanding the above, structural association of a fault with geologic structural features that are at least pre-Quaternary in use, in the absence of conflicting evidence, demonstrates that the fault is not a capable fault within this definition.

Capacity Factor: The ratio of the annual power production of a power plant to its rated capacity.

Carbon Adsorption: A physiochemical process in which organic and certain inorganic compounds in a liquid stream are absorbed on a bed of activated carbon; used in water or waste purification and chemical processing.

Carbon Dioxide (CO₂): A colorless, odorless, nonpoisonous gas that is a normal component of the ambient air; it is an expiration product of normal animal life.

Carbon Monoxide (CO): A colorless, odorless gas that is toxic if breathed in high concentration over a period of time.

Carolina Bay: Ovate, intermittently flooded depression of a type occurring on the Coastal Plain from New Jersey to Florida.

Cask (Radioactive Materials): A container that meets all applicable regulatory requirements for shipping spent nuclear fuel or HLW.

Cenozoic Era: A geologic era characterized by the dominance of advanced mollusks and mammals. The Cenozoic Era dates from 65 million years ago to the present.

Ceramic: For this PEIS, surplus Pu and other materials mixed to form a porcelain end product which has mineral phases similar to Synroc-C.

Cesium (Cs): A silver-white alkali metal. A radioactive isotope of cesium, Cs-137, is a common fission product.

Chemical Oxygen Demand: A measure of the quantity of chemically oxidizable components present in water.

Chronic: Lasting for a long period of time or marked by frequent recurrence.

Chronic Exposure: Low-level radiation exposure incurred over a long time period due to residual contamination.

Chronic Standard: A numerical limit on the amount of a particular chemical contaminant that an organism may be exposed to over an extended period of time. The allowable exposure concentration for the chronic standard is less than that of the acute standard.

Cladding: An external layer of material applied directly to nuclear fuel or other material to provide protection from a chemically reactive environment, to provide containment of radioactive products produced during the irradiation of the composite, or to provide structural support.

Clean Air Act (CAA): This Act mandates and enforces air pollutant emissions standards for stationary sources and motor vehicles.

Clean Air Act Amendments of 1990: Expands the EPA's enforcement powers and adds restrictions on air toxics, ozone depleting chemicals, stationary and mobile emissions sources, and emissions implicated in acid rain and global warming.

Clean Water Act (CWA) of 1972, 1987: This Act regulates the discharge of pollutants from a point source into navigable waters of the United States in compliance with a NPDES permit as well as regulates discharges of dredge or fill material to waters of the United States including wetlands.

Climatology: The science that deals with climates and investigates their phenomena and causes.

Code of Federal Regulations (CFR): All Federal regulations in force are published in codified form in the CFR.

Cold Standby: Maintenance of a protected reactor condition in which the fuel is removed, the moderator is stored in tanks, and equipment and system layup is performed to prevent deterioration, such that future refueling and restart are possible.

Coliform: Normally harmless types of bacteria that reside in the intestinal tract of humans and other animals whose presence in water is an indicator that the water may be contaminated with other disease-causing organisms found in untreated human and animal waste.

Collapse Depression: A depression formed when underground lava or gases move or escape (for example, in an eruption) and the ground above collapses.

Collected Dose Equivalent: The sum of per capita dose equivalents for a given organ over the number of exposed individuals.

Collective Committed Effective Dose Equivalent: The committed effective dose equivalent of radiation for a population.

Committed Effective Dose Equivalent: The predicted total dose equivalent to a tissue or organ over a 50-year period after an intake of radionuclide into the body. It does not include external dose contributions. Committed dose equivalent is expressed in units of rem or Sievert. The committed effective dose equivalent is the sum of the committed dose equivalents to the various tissues of the body, each multiplied by the appropriate weighting factor.

Community (Biotic): All plants and animals occupying a specific area under relatively similar conditions.

Complex: The Nuclear Weapons Complex, which is a set of Federal sites and government-owned/contractor-operated facilities administered by DOE.

Compound (Other Than Oxides): Fluorides, carbides, chlorides, and other materials containing less than 50 percent impurities of Pu that may require chemical processing for some disposition options.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Superfund): This Act provides a regulatory framework for remediation of past contamination from hazardous waste. If a site meets the Act's requirements for designation, it is ranked along with other "Superfund" sites and is listed on the NPL. This ranking is the EPA's way of determining which sites have the highest priority for cleanup.

Conceptual Design: Efforts to develop a project scope that will satisfy program needs; ensure project feasibility and attainable performance levels for congressional consideration; develop project criteria and design parameters for all engineering disciplines; and identify applicable codes and standards, quality assurance requirements, environmental studies, construction materials, space allowances, energy conservation features, health, safety, safeguards, security requirements, and any other features or requirements necessary to describe the project.

Confined Aquifer: A permeable geological unit containing water that is at a pressure higher than atmospheric pressure. It is bounded above and below by aquitards.

Consumptive Water Use: The difference in the volume of water withdrawn from a body of water and the amount released back into the body of water.

Container: The metal envelope in the waste package that provides the primary containment function of the waste package and is designed to meet the containment requirements of 10 CFR 60.

Control Rods: The elements of a nuclear reactor that absorb slow neutrons and are used to increase, decrease, or maintain the neutron density in the reactor.

Conversion: An operation for changing material from one form, use, or purpose to another.

Coolant: A substance, either gas or liquid, circulated through a nuclear reactor or processing plant to remove heat.

Cosmic Radiation: Streams of highly penetrating, charged particles, composed of protons, alpha particles, and a few heavier nuclei, that bombard the earth from outer space.

Counter-proliferation: The activities of the DoD across the full range of U.S. efforts to combat proliferation, including diplomacy, arms control, export controls, and intelligence collection and analysis, with particular responsibility for assuring that U.S. forces and interests can be protected should they confront an adversary armed with weapons of mass destruction or missiles.

Credible Accident: An accident that has a probability of occurrence greater than or equal to one in a million years.

Cretaceous: The geologic period making up the end of the Mesozoic Era, dating from approximately 144 million to 66 million years ago.

Criteria Pollutants: Six air pollutants for which national ambient air quality standards are established by EPA: sulfur dioxide, nitric oxides, carbon monoxide, ozone, particulate matter less than or equal to 10 microns in diameter, and lead.

Critical Action: Any activity for which even a slight chance of flooding would be too great; such actions may include the storage of highly volatile, toxic, or water reactor materials (10 CFR 1022).

Critical Habitat: Defined in the *Endangered Species Act* of 1973 as “specific areas within the geographical area occupied by [an endangered or threatened] species..., essential to the conservation of the species and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species... that are essential for the conservation of the species.”

Critical Mass: The smallest mass of fissionable material that will support a self-sustaining nuclear chain reaction under specified conditions.

Criticality: A state in which a self-sustaining nuclear chain reaction is achieved.

Crystalline Rock: Rock consisting of minerals in a crystalline state.

Cultural Resources: Archaeological sites, architectural features, traditional use areas, and Native American sacred sites.

Cumulative Impacts: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal), private industry, or individual undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7.)

Curie: A unit of radioactivity equal to 37 billion disintegrations per second; also a quantity of any nuclide or mixture of nuclides having 1 curie of radioactivity.

Decay (Radioactive): The decrease in the amount of any radioactive material with the passage of time, due to the spontaneous transformation of an unstable nuclide into a different nuclide or into a different energy state of the same nuclide; the emission of nuclear radiation (alpha, beta, or gamma radiation) is part of the process.

Decay Heat (Radioactivity): The heat produced by the decay of certain radionuclides.

Decibel (dB): A unit of sound measurement. In general, a sound increases in loudness by a factor of 10 for every increase of 10 decibels.

Decibel, A-weighted (dBA): A unit of weighted sound pressure level, measured by the use of a metering characteristic and the “A” weighting specified by the ANSI S1.4-1971(R176), that refers to the effect on humans.

Decontamination: The removal of radioactive or chemical contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques.

Demilitarization: An irreversible modification or destruction of a weapons component or part of a component to the extent required to prevent use in its original weapon purpose.

Demography: The statistical study of human populations, including size, density, distribution, and such vital statistics as age, sex, and ethnicity.

Depleted Uranium: Uranium whose content of the isotope U-235 is less than 0.7 percent, which is the U-235 content of naturally occurring uranium.

Deposition: In geology, the laying down of potential rock-forming materials; sedimentation. In atmospheric transport, the settling out on ground and building surfaces of atmospheric aerosols and particles (“dry deposition”) or their removal from the air to the ground by precipitation (“wet deposition” or “rainout”).

Derived Concentration Guide (DCG): The concentration of a radionuclide in air or water which, under conditions of continuous exposure by one exposure mode (that is, ingestion of water or submersion or inhalation of air) for one year, a "reference man" would receive the most restrictive of (1) an effective dose equivalent of 100 mrem or (2) a dose equivalent of 5 rem to any tissues, including skin and lens of the eye.

Design Basis: For nuclear facilities, information that identifies the specific functions to be performed by a structure, system, or component and the specific values (or ranges of values) chosen for controlling parameters for reference bounds for design. These values may be: (1) restraints derived from generally accepted state-of-the-art practices for achieving functional goals; (2) requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals; or (3) requirements derived from Federal safety objectives, principles, goals, or requirements.

Design-Basis Accident (DBA): For nuclear facilities, a postulated abnormal event that is used to establish the performance requirements of structures, systems, and components that are necessary to (1) maintain them in a safe shutdown condition indefinitely or (2) prevent or mitigate the consequences of the design-basis accident so that the general public and operating staff are not exposed to radiation in excess of appropriate guideline values.

Design-Basis Events: Postulated disturbances in process variables that can potentially lead to design-basis accidents.

Design Laboratory: A DOE facility involved in the design of nuclear weapons.

Detritus: Dead organic material and organisms.

Deuterium: A nonradioactive isotope of the element hydrogen with one neutron and one proton in the atomic nucleus.

Deuterium Oxide: See "Heavy Water."

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Dip: The acute angle that a structural surface (for example, a bedding or fault plane) in a geologic material makes with the horizontal, measured perpendicular to the strike of the surface. Updip is at a higher elevation on the surface.

Direct Economic Effects: The initial increases in output from different sectors of the economy resulting from some new activity within a predefined geographic region.

| **Direct Jobs:** The number of workers required at a site to implement an alternative.

Discard: To dispose of material as waste.

Dismantlement: The process of taking apart a nuclear warhead and removing the subassemblies, components, and individual parts.

| **Disposal:** The process of placing waste in a final repository.

Disposition: A process of use or disposal of materials that results in the remaining material being converted to a form that is substantially and inherently more proliferation-resistant than the original form.

Dissolution: The chemical dispersal of a solid throughout a liquid medium.

Dolomite: A mineral composed of calcium magnesium carbonate ($\text{CaMg}(\text{CO}_3)_2$) and the chief constituent in the rock also commonly called dolomite and of some kinds of marble.

Dome: For geology it is a circular or elliptical uplift with older beds in the center whose beds dip away in all directions from a central area. For topography it is any dome-shaped rock mass.

Dose: The energy imparted to matter by ionizing radiation. The unit of absorbed dose is the rad or gray.

Dose Commitment: The dose an organ or tissue would receive during a specified period of time (for example, 50 to 100 years) as a result of intake (by ingestion or inhalation) of one or more radionuclides from a defined release, frequently over a year's time.

Dose Equivalent: The product of absorbed dose in rad or gray and the effect of this type of radiation in tissue and a quality factor. Dose equivalent is expressed in units of rem or Sievert, where 1 rem equals 0.01 Sievert. The dose equivalent to an organ, tissue, or the whole body will be that received from the direct exposure plus the 50-year committed dose equivalent received from the radionuclides taken into the body during the year.

Dosimeter: A small device or instrument (for example, film badge or ionization chamber) carried by a radiation worker that measures cumulative radiation dose.

Drainage Basin: An above ground area that supplies the water to a particular stream.

Drawdown: The height difference between the natural water level in an aquifer and the reduced water level in the formation caused by the withdrawal of groundwater.

Drift: Effluent mist or spray carried into the atmosphere from cooling towers.

Drinking-Water Standards: The prescribed level of constituents or characteristics in a drinking water supply that cannot be exceeded legally.

Dry Site: For the purpose of this PEIS any site where adequate surface water is not abundantly available for storage and disposition needs. At such sites, groundwater is used for water supply.

Effective Dose Equivalent: The summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor. This sum is a risk-equivalent value and can be used to estimate the health effects risk of the exposed individual. The tissue-specific weighting factor represents the fraction of the total health risk resulting from uniform whole-body irradiation that would be contributed by that particular tissue. The effective dose equivalent includes the committed effective dose equivalent from internal deposition of radionuclides, and the effective dose equivalent due to penetrating radiation from sources external to the body. Effective dose equivalent is expressed in units of rem or Sievert.

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Effluent: A gas or fluid discharged into the environment.

Emergency Condition: For a nuclear facility, occurrences or accidents that might occur infrequently during start-up testing or operation of the facility. Equipment, components, and structures might be deformed by these conditions to the extent that repair is required prior to reuse.

Emission Standards: Legally enforceable limits on the quantities and/or kinds of air contaminants that can be emitted into the atmosphere.

Empirical: Something that is based on actual measurement, observation, or experience rather than on theory.

Endangered Species: Defined in the ESA of 1973 as “any species which is in danger of extinction throughout all or a significant part of its ranges.”

Endangered Species Act (ESA) of 1973: This Act requires Federal agencies, with the consultation and assistance of the Secretaries of the Interior and Commerce, to ensure that their actions will not likely jeopardize the continued existence of any endangered or threatened species or adversely affect the habitat of such species.

Engineered Safety Features: For a nuclear facility, features that prevent, limit, or mitigate the release of radioactive material from its primary containment.

Entrainment: The involuntary capture and inclusion of organisms in streams of flowing water, a term often applied to the cooling water systems of power plants/reactors. The organisms involved may include phyto- and zooplankton, fish eggs and larvae (ichthyoplankton), shellfish larvae, and other forms of aquatic life.

Environment, Safety, and Health (ES&H) Program: In the context of DOE, encompasses those DOE requirements, activities, and functions in the conduct of all DOE and DOE-controlled operations that are concerned with: impacts to the biosphere; compliance with environmental laws, regulations, and standards controlling air, water, and soil pollution; limiting the risks to the well-being of both operating personnel and the general public to acceptably low levels; and protecting property adequately against accidental loss and damage. Typical activities and functions related to this program include, but are not limited to, environmental protection, occupational safety, fire protection, industrial hygiene, health physics, occupational medicine, and process and facilities safety, nuclear safety, emergency preparedness, quality assurance, and radioactive and hazardous waste management.

Environmental Assessment (EA): A written environmental analysis that is prepared pursuant to NEPA to determine whether a Federal action would significantly affect the environment and thus require preparation of a more detailed EIS. If the action does not significantly affect the environment, then a FONSI is prepared.

Environmental Audit: A documented assessment of a facility to monitor the progress of necessary corrective actions, to ensure compliance with environmental laws and regulations, and to evaluate field organization practices and procedures.

Environmental Documentation: Documents describing information and results from studies and evaluations required by NEPA. This documentation includes both an EA and an EIS.

Environmental Impact Statement (EIS): A document required of Federal agencies by NEPA for major proposals or legislation significantly affecting the environment. A tool for decisionmaking, it describes the positive and negative effects of the undertaking and alternative actions.

Environmental Justice: The fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no population of people should be forced to shoulder a disproportionate share of the negative environmental impacts of pollution or environmental hazards due to a lack of political or economic strength.

Environmental Survey: A documented, multidisciplinary assessment (with sampling and analysis) of a facility to determine environmental conditions and to identify environmental problems requiring corrective action.

Eocene: A geologic epoch early in the Cenozoic Era, dating from approximately 54 to 38 million years ago.

Ephemeral Stream: A stream that flows intermittently, typically only after periods of heavy precipitation.

Epicenter: The point on the Earth's surface directly above the focus of an earthquake.

Epidemiology: The science concerned with the study of events that determine and influence the frequency and distribution of disease, injury, and other health-related events and their causes in a defined human population.

Equivalent Sound (Pressure) Level: The equivalent steady sound level that, if continuous during a specified time period, would contain the same total energy as the actual time-varying sound. For example, L_{eq} (1-h) and L_{eq} (24-h) are the 1-hour and 24-hour equivalent sound levels, respectively.

Estuary: A thin zone along a coastline where fresh water from rivers mixes with salty ocean waters that provides aquatic habitats with a lower average salinity (salt concentration) than ocean waters. Three-fourths of the commercially important aquatic animal species in the United States spend all or part of their life in estuaries and coastal wetlands.

Evaluation Basis Accident: An accident generally with small impacts to the public, initiated by operational or external causes with an estimated probability of occurrence greater than 10^{-6} per year and used for estimating the impacts of a planned new or modified facility, and/or process when a Safety Analysis Report, that would define a DBA, has not been prepared. A DBA is used to establish the performance requirements of structures, systems, and components that are necessary to maintain them in a safe shutdown condition indefinitely or to prevent or mitigate the consequences of the DBA so that the public and onsite personnel are not exposed to radiation in excess of appropriate guidelines values.

Executive Order 12372, Intergovernmental Review of Federal Programs: The Order directs Federal agencies to consult with and solicit input from state and local governments whose jurisdictions would be affected by Federal actions.

Exposure Limit: The level of exposure to a hazardous chemical (set by law or a standard) at which or below which adverse human health effects are not expected to occur:

- Reference dose is the chronic exposure dose (mg/kg/day) for a given hazardous chemical at which or below which adverse human non-cancer health effects are not expected to occur.
- Reference concentration is the chronic exposure concentration (mg/m³) for a given hazardous chemical at which or below which adverse human non-cancer health effects are not expected to occur.

Farmland Protection Policy Act: The purpose of the Act is to reduce the conversion of farmland to nonagricultural uses by Federal projects and programs. The Act requires that Federal agencies comply to the fullest extent possible with state and local government policies to preserve farmland. Specifically, the Act advises that evaluations and analyses of prospective farmland conversion impacts be made early in the planning process before a site or design is selected and that, where possible, agencies make such evaluations and analyses part of the NEPA process.

Fast Reactor: A fast reactor does not contain a moderator to slow down neutrons after they are generated. It is distinguished from a fast breeder reactor by not necessarily producing more fuel than it consumes.

Fault: A fracture or a zone of fractures within a rock formation along which vertical, horizontal, or transverse slippage has occurred. A normal fault occurs when the hanging wall has been depressed in relation to the footwall. A reverse fault occurs when the hanging wall has been raised in relation to the footwall. A thrust fault is a low-angle (dip less than about 30 degrees) reverse fault.

Fault-plane: A fault surface that is more or less flat or level.

Fauna: Animals, especially those of a specific region, considered as a group.

Federal Land Policy and Management Act: This act states that all public lands would be retained in Federal ownership unless it is determined that another use would better serve the interests of the nation. Specifically, the Act addresses land retained in public-domain status, land withdrawn from the public domain for use by a Federal agency, land to be returned to the public domain, or public land identified for disposal. Additionally, the Act requires that public lands be managed in a manner that would protect the quality of its scientific, scenic, historical, ecological, and environmental aspects; and that public lands and their resources be inventoried periodically and systematically.

Finding of No Significant Impact (FONSI): A document by a Federal agency briefly presenting the reasons why an action, not otherwise excluded, will not have a significant effect on the human environment and will not require an EIS.

Fissile: The term “fissile” refers to nuclear materials that are fissionable by slow (thermal) neutrons. Fissile materials include U-235, U-233, Pu-239, and Pu-241. Materials such as U-238 and Th-232, which can be converted into fissile materials, are called fertile materials. It should be noted that Th-232, U-238 and all Pu isotopes are fissionable by fast neutrons but not by thermal (slow) neutrons. They are not called fissile materials but may be called fissionable materials.

Fissile Material: Pu-239, Pu-241, U-233, U-235, or any material containing any of the foregoing.

Fission: The splitting of a heavy atomic nucleus into at least two nuclei of lighter elements, accompanied by the release of energy and generally one or more neutrons. Fission can occur spontaneously or be induced by neutron bombardment.

Fission Products: Nuclei formed by the fission of heavy elements (primary fission products); also, the nuclei formed by the decay of the primary fission products, many of which are radioactive.

Fissionable Material: Material whose nuclei fission when bombarded by neutrons.

Fissure: A long and narrow crack in the earth.

Floodplain: The lowlands adjoining inland and coastal waters and relatively flat areas including at a minimum that area inundated by a 1-percent or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0 percent) floodplain. The critical action floodplain is defined as the 500-year (0.2 percent) floodplain.

Flora: Plants, especially those of a specific region, considered as a group.

Footwall: The mass of rock beneath a fault plane.

Formation: In geology, the primary unit of formal stratigraphic mapping or description. Most formations possess certain distinctive features.

Fossil: Impression or trace of an animal or plant of past geological ages that has been preserved in the earth's crust.

Fossiliferous: Containing a relatively large number of fossils.

Frit: Finely ground glass used as feedstock input for vitrification.

Fuel-Grade Material: Pu and HEU, in various forms (for example, metals and oxides), that can be used in experimental and research reactors. Fuel grade Pu contains between 7 to 19 percent Pu-240.

Fugitive Emissions: Emissions to the atmosphere from pumps, valves, flanges, seals, and other process points not vented through a stack. Also includes emissions from area sources such as ponds, lagoons, landfills, and piles of stored material.

Gamma Radiation: Short-wavelength electromagnetic radiation of nuclear origin, similar to, but with higher energy than, x rays.

Gamma Rays: High-energy, short-wavelength, electromagnetic radiation accompanying fission and emitted from the nucleus of an atom. Gamma rays are very penetrating and can be stopped only by dense materials (such as lead) or a thick layer of shielding materials.

Gaussian Plume: The distribution of material (a plume) in the atmosphere resulting from the release of pollutants from a stack or other source. The distribution of concentrations about the centerline of the plume, which is assumed to decrease as a function of its distance from the source and centerline (Gaussian distribution), depends on the mean wind speed and atmospheric stability.

Genetic Effects: The outcome resulting from exposure to mutagenic chemicals or radiation which results in genetic changes in germ line or somatic cells.

- Effects on genetic material in germ line (sex cells) cause trait modifications that can be passed from parents to offspring.
- Effects on genetic material in somatic cells result in tissue or organ modifications (for example, liver tumors) that do not pass from parents to offspring.

Geologic Repository (Mined Geologic Repository): A HLW repository pursuant to the NWPA as amended, for the disposal of nuclear waste; the waste is isolated by placement in a continuous, stable geologic formation at depths greater than 300 m (984 ft).

Geology: The science that deals with the study of the Earth: the materials, processes, environments, and history of the planet, including the rocks and their formation and structure.

Gigawatt Electric: A gigawatt electric is equal to one thousand MWe or one billion watts of electric power.

Glass: Borosilicate material in an amorphous mixture formed by melting silica and boric oxide together with the oxides of elements such as sodium.

Global Commons: Resources not yet allocated to national states. Resources primarily include oceans and outer space. The inclusion of Antarctica as a "Global Commons" area is controversial, and no professional consensus has been determined.

Glove Box: An airtight box used to work with hazardous material, vented to a closed filtering system, having gloves attached inside of the box to protect the worker.

Ground Shine: An area on the ground where radioactivity has been deposited by a radioactive plume or cloud.

Groundwater: The supply of water found beneath the Earth's surface, usually in aquifers, which may supply wells and springs.

Guideline Level: A suggested, desired level of concentration. It is not a regulatory value, but is a value offered as desirable by an agency to protect human health or the environment.

Half-life (Radiological): The time in which half the atoms of a radioactive substance decays to another nuclear form; this varies for specific radioisotopes from millionths of a second to billions of years.

Hazard Index (HI): A summation of the HQ for all chemicals now being used at a site and those proposed to be added to yield cumulative levels for a site. A HI value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur.

Hazard Quotient (HQ): The value used as an assessment of non-cancer associated toxic effects of chemicals, (for example, kidney or liver dysfunction). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens.

Hazardous Material: A material, including a hazardous substance, as defined by 49 CFR 171.8 which poses a risk to health, safety, and property when transported or handled.

Hazardous/Toxic Waste: Any solid waste (can also be semisolid or liquid, or contain gaseous material) having the characteristics of ignitability, corrosivity, toxicity, or reactivity, defined by RCRA and identified or listed in 40 CFR 261 or by TSCA.

Heat Exchanger: A device that transfers heat from one fluid (liquid or gas) to another.

Heavy Metals: Metallic or semimetallic elements of high molecular weight, such as mercury, chromium, cadmium, lead, and arsenic, that are toxic to plants and animals at known concentrations.

Heavy Water: A form of water (a molecule with two hydrogen atoms and one oxygen atom) in which the hydrogen atoms consist largely or completely of the deuterium isotope. Heavy water has almost identical chemical properties, but quite different nuclear properties, as light water (common water).

Hemi-shells: Product that results when a pit is divided into two half pieces.

High Efficiency Particulate Air (HEPA) Filter: A filter used to remove particulates from dry gaseous effluent streams.

High-Level Waste (HLW): The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid. HLW contains a combination of transuranic waste and fission products in concentrations requiring permanent isolation.

Highly Enriched Uranium (HEU): Uranium enriched in isotope U-235 to 20 percent or above, which becomes suitable for weapons use.

Historic Resources: In the United States, (that is, archaeological sites), architectural structures, and objects produced from 1492 on, after the arrival of the first Europeans to the Americas.

Holocene: The current epoch of geologic time, which began approximately 10,000 years ago.

Hydraulic Conductivity: The constant of proportionality in Darcy's Law of fluid flow that describes the ease with which a porous medium permits fluids to flow and the ease with which the fluid flows given its physical properties.

| [Text deleted.]

Hygroscopic: Capable of absorbing and retaining moisture.

| **Igneous Rock:** Rock originally formed by the cooling and consolidation of magma (molten silicate minerals) including volcanic rocks and plutonic rocks.

Immersion Dose: Dose resulting from being surrounded by a medium (air or water) that contains radionuclides.

| **Immobilization:** A process that converts Pu to a chemically stable form for disposal.

Impingement: The process by which aquatic organisms too large to pass through the screens of a water intake structure become caught on the screens and are unable to escape.

Impoundment: A collection area for water, usually for irrigation purposes.

Incident-Free Risk: The radiological or chemical impacts resulting from packages aboard vehicles in normal transport. This includes the radiation or hazardous chemical exposure of specific population groups such as crew, passengers, and bystanders.

Indirect Economic Effects: Indirect effects result from the need to supply industries experiencing direct economic effects with additional outputs to allow them to increase their production. The additional output from each directly affected industry requires inputs from other industries within a region (that is, purchases of goods and services). This results in a multiplier effect to show the change in total economic activity resulting from a new activity in a region.

| **Indirect Jobs:** Within an REA, jobs generated or lost in related industries as a result of a change in direct employment.

Infrastructure: The basic facilities, services, and installations needed for the functioning of a plant or other site, such as transportation and communication systems.

Injection Well: A well that transfers water from the surface into the ground, either through gravity or by mechanical means.

Interbedded: Occurring between beds or lying in a bed parallel to other beds of a different material.

Interfluvial: Falling in the area between two streams.

Interim (Permit) Status: Period during which treatment, storage, and disposal facilities coming under RCRA are temporarily permitted to operate while awaiting denial or issuance of a permanent permit.

| **Interim Storage:** Providing safe and secure capacity in the near term to support continuing operations in the interim period until long-term storage or disposition actions are implemented.

Ion Exchange: A physiochemical process that removes anions and cations, including radionuclides, from liquid streams (usually water) for the purpose of purification or decontamination.

Ionizing Radiation: Radiation that can displace electrons from atoms or molecules, thereby producing ions.

Isotope: An atom of an element with a specific atomic number and atomic mass. Isotopes of the same element have the same number of protons (atomic number) but different numbers of neutrons and different atomic masses.

Joule: A metric unit of energy, work, or heat, equivalent to 1 watt-second, 0.737 foot-pound, or 0.239 calories.

Jurassic: The middle period of the Mesozoic Era, dating from 208 million to 144 million years ago.

Karst Terrain: A type of land surface that is found in regions underlain by soluble rocks, such as limestone and dolomite, which is peculiar to and dependent upon underground solution of the bedrock and the diversion of surface waters to underground waters (that is, streams that disappear underground). Karst terrain is characterized by sinkholes, underground streams, and caves.

Lacustrine Wetland: Lakes, ponds, and other enclosed open waters at least 8 ha (20 acres) in extent and not dominated by trees, shrubs, and emergent vegetation.

Lag Storage: Temporary storage at a disposition facility.

Land Resources: Land resources are comprised of all of the terrestrial areas available for economic production, residential or recreational use, Government activities (such as military bases), or natural resources consumption. The patterns and densities of land use and the quality of visual resources are evaluated under land resources.

Land Use: The characterization of land in terms of the use potential of the land's surface for the location of various activities.

Landscape Character: The arrangement of a particular landscape as formed by the variety and intensity of the landscape features (land, water, vegetation, and structures) and the four basic elements (form, line, color, and texture). These factors give an area a distinctive quality that distinguishes it from its immediate surroundings.

Large Release: A release of radioactive material that would result in doses greater than 25 rem to the whole body or 300 rem to the thyroid at 1.6 km (1 mi) from the control perimeter (security fence) of a reactor facility.

Latent Fatalities: Fatalities associated with acute and chronic environmental exposures to chemical or radiation that occur within 30 years of exposure.

Lava Tube: A hollow space beneath the surface of a solidified lava flow, formed by the withdrawal of molten lava after the formation of the surficial crust.

Light Water: The common form of water (a molecule with two hydrogen atoms and one oxygen atom) in which the hydrogen atom consists largely or completely of the normal hydrogen isotope (one proton).

Light Water Reactor: There are two types of light water reactors. One is a pressurized water reactor and the other is a boiling water reactor. Both are thermal reactors in which circulating light water is used to cool the reactor core and to moderate (reduce the energy of) the neutrons created in the core by the fission reactions. All commercially operating reactors in the United States and most commercial reactors worldwide are LWRs.

Light Water Reactor (MOX Fuel): An LWR with full MOX fuel is fueled with fuel rods each containing a mixture or blend of uranium oxide and plutonium oxide. Traditional programs of using Pu in LWRs start with a partial core, not full core of MOX fuel.

Limited-lifetime Component: A weapon component that decays with age and must be replaced periodically.

Lithic: Pertaining to stone or a stone tool.

Lithic Scatter: An archaeological site consisting of stone artifacts and by-products of their manufacture and maintenance.

Lithologic: Pertaining to the structure and composition of a rock.

Long-Lived Radionuclides: Radioactive isotopes with half-lives greater than about 30 years.

Low-Enriched Uranium (LEU): Naturally occurring uranium contains only about 0.7 percent U-235 and almost all of the rest is U-238. Low-enriched uranium is enriched in the isotopic content of U-235, greater than 0.7 percent but less than 20 percent of the total mass, for use as LWR fuel.

Low-Level Waste (LLW): Waste that contains radioactivity but is not classified as HLW, TRU waste, spent nuclear fuel, or "11e(2) by-product material" as defined by DOE Order 5820.2A, *Radioactive Waste Management*. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or Pu, may be classified as LLW, provided the concentration is less than 100 nanocuries per gram, which would then be TRU waste. Some LLW is considered classified because of the nature of the generating process and/or constituents, because the waste would tell too much about the process.

Mandatory Standards: Standards adopted by the DOE that define the minimum requirements that the DOE and its contractors must comply with. Standards may be classified as mandatory because of applicable Federal or state statutes or implementing requirements, or as a matter of DOE policy.

Marsh: An area of low-lying wetland, dominated by grasslike plants.

Mastodon: Any of numerous extinct mammals that differ from the related mammoths and existing elephants chiefly in the form of molar teeth.

Maximum Contaminant Level: The maximum permissible level of a contaminant in drinking water delivered to any user of a public water system. Maximum contaminant levels are enforceable standards.

Maximally Exposed Individual (MEI): A hypothetical person who could potentially receive the maximum dose of radiation or hazardous chemicals.

Megajoule: A unit of power equal to 1 million joules. See "Joule."

Megawatt (MW): A unit of power equal to 1 million watts. Megawatt thermal is commonly used to define heat produced, while megawatt electric defines electricity produced.

Mesozoic: The geologic era dating from 245 million to 66 million years ago. The Mesozoic Era is the era of the dinosaurs.

Metal: Essentially pure Pu metal that meets weapons specifications. The Pu can be weapons grade, fuels grade, or reactor grade. The metal may have oxidation or casting residues on the surface.

Metal Reduction: The conversion of a compound such as plutonium dioxide or plutonium tetrafluoride into metal.

Metamorphic Rock: Rock formed by the transformation of preexisting rocks in response to changes in temperature and/or pressure, and the chemical action of fluids.

Meteorology: The science dealing with the atmosphere and its phenomena, especially as relating to weather.

Migration: The natural movement of a material through the air, soil, or groundwater; also, seasonal movement of animals from one area to another.

Migratory Bird Treaty Act: This act states that it is unlawful to pursue, take, attempt to take, capture, possess, or kill any migratory bird, or any part, nest, or egg of any such bird other than permitted activities.

Minor Actinides: Radioactive element with an atomic number larger than 95 (that is, 96 or higher).

Miocene: A geologic epoch in the Cenozoic Era dating from 26 to 7 million years ago.

Mississippian Period (Geologic): A portion of the Paleozoic Era in North America dating from 360 to 330 million years ago (following the Devonian Period and preceding the Pennsylvanian Period).

Mixed Oxide (MOX): A physical blend of uranium oxide and plutonium oxide.

Mixed Waste: Waste that contains both "hazardous waste" and "radioactive waste" as defined in this glossary.

Modified Mercalli Intensity (MMI): A level on the modified Mercalli scale. A measure of the perceived intensity of earthquake ground shaking with 12 divisions, from I (not felt by people) to XII (damage nearly total). It is a unitless expression of observed effects.

Mutation: Inheritable changes in the DNA molecules found in genes as a result of exposure to various environmental factors such as radiation or certain chemicals.

National Ambient Air Quality Standards (NAAQS): Air quality standards established by the CAA, as amended. The primary NAAQS are intended to protect the public health with an adequate margin of safety, and the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

National Asset Reserve: The quantity of U.S. Pu above that amount in the stockpile, the production process, R&D inventories, and the strategic reserve.

National Emission Standards for Hazardous Air Pollutants (NESHAP): A set of national emission standards for listed hazardous pollutants emitted from specific classes or categories of new and existing sources. These were implemented in the CAA Amendments of 1977.

National Environmental Policy Act (NEPA) of 1969: This Act is the basic national charter for the protection of the environment. It requires the preparation of an EIS for every major Federal action that may significantly affect the quality of the human or natural environment. Its main purpose is to provide environmental information to decision makers so that their actions are based on an understanding of the potential environmental consequences of a proposed action and its reasonable alternatives.

National Environmental Research Park (NERP): An outdoor laboratory set aside for ecological research to study the environmental impacts of energy developments. NERPs were established by DOE to provide protected land areas for research and education in the environmental sciences and to demonstrate the environmental compatibility of energy technology development and use.